

Date: 12 July 2015

Location: Continuing the transit to the SAR Exercise location east of Barrow

Primary Activities: Puma and Aerostat joint sortie; University of Alaska Anchorage Atmospheric Isotope Analysis; Coast Guard Academy Additive Manufacturing

Conditions: Medium to heavy broken ice and fog throughout the day

Temperatures: Air temperature range 39 - 48 F; water temperature 30 - 41 F

The primary objective for today was to reach the SAR exercise location on time. We conducted one joint air sortie with the PUMA and Aerostat, and the other items reported in this SitRep are about technology evaluations that occur on a more continuous cycle and/or don't require modifications to ship operations such as course and speed. Also, please note that the photos included in the SitReps are compressed, thus not the highest resolution, due to file-size limitations. We can provide the higher resolution photos upon request when we return.

Today, the Puma and the Aerostat teams flew a joint sortie, the objective being to establish a link from the Puma through the Aerostat to the Ground Control Station (GCS) on the CGC HEALY. Although they were unable to establish the link today, the teams were able to apply lessons learned and modified tactics, techniques, and procedures (TTPs), which they will validate via ground checks before the next sortie.

The Aerostat team identified additional lessons learned specific to them. While flying in the transition zone just below the fog, the mesh sail on the bottom of the balloon



collected moisture and began accumulating ice. This potentially impacts payload capacity and flight characteristics. The team is working to identify potential solutions, to include TTP adjustments and/or material changes, to mitigate this issue. Also of note, the Aerostat team has been training members of the HEALY deck crew, four to date, on launch and recovery operations. This provides the crew with practical experience and gives the Aerostat team valuable operational insight.

This year, Professor Jeff Welker and research scientist Dr. Eric Klein from the University of Alaska Anchorage (UAA) are aboard to collect continuous real time air samples from the bow of HEALY using advanced carbon and water isotope measuring devices; since leaving Kodiak, they have collected over 3.5 million isotope measurements. Their intent is to gain a better understanding of how 1) water vapor isotopes in the atmosphere vary across different environmental conditions such as sea ice extent or weather, 2) how these variations reflect changes in ocean productivity and contaminants to include fuel and oil leaks and discharges, and 3) options for effectively and efficiently collecting these data. Professor Welker and Dr. Klein are members of the new UAA Arctic Domain Awareness Center of Excellence (ADAC) through the Department of Homeland Security's (DHS) Office of University Programs. ADAC's primary mission is to develop a new suite of measurement, modeling packages, and products that will assist and inform federal, state, and local agencies and mariners on Arctic and sub-Arctic maritime and coastal systems.

Professor Ron Adrezin from the U.S. Coast Guard Academy is evaluating additive manufacturing (3D printing) capabilities and application on HEALY. The potential operational uses include repair of components, component replacement (same geometry or optimized), specialty tools, and fixture design. In one of the first test cases, Prof. Adrezin worked with the SPAWAR wave glider team and Nicholas Haliscak, a DHS S&T intern at RDC, to produce a protective shield to keep water off the glider's camera lens. Within 2 hours the team drafted a design, printed a test section, tweaked the design, and then printed the part overnight in preparation for next day operations.





Professor Adrezin is also evaluating optimization software, the objective being to reduce the amount of time and material required to manufacture items. Using this software, he and Nicholas were able to manufacture a replacement part for the Shore Transfer Boat team in approximately 1/5 the time and with significantly less material than required for the original part. Ultimately, these proof-of-concept evaluations will position the Coast Guard to leverage this technology as it becomes main stream. More to follow on this capability.

Tomorrow, the science team and crew prepare for the multiple air asset SAR exercise!